foam-making is not quite accurate. But this is merely a crumpled rose-leaf. Summer's memories deal with butterflies, British orchids, the behaviour of a hunter-wasp, the ways of char, and the insurgence of climbing plants. Here also is included an unashamed confession of faith in the powers of the divining rod. In the fall of the year Sir Herbert discourses on gossamer and migration; in midwinter he brings us up against such problems as the otter's survival in the hard months and the general question of animal intelligence. In connection with animal behaviour, the author inclines, if we understand him rightly, to a somewhat remarkable transcendental conclusion, that conscious intelligence is "the consequence of an external and superior mandate or suggestion, acting upon a suitable physical receptacle." "Assuming a First Cause, instinctive activities in the lower animals may be regarded as the comparatively simple and intelligible results of forces initiated by him, acting unerringly in prescribed directions by means of co-ordinate organs modified by evolution." In short, this lifelong student of the ways of living creatures is frankly dualistic. But he does not seek to ram his philosophy down the reader's throat.

We notice a few slips in the pages; thus Fabre's volumes are referred to as "Etudes Entomologiques," and again as "Mémoires Entomologiques," whereas the title was surely neither. But such slips are trivial in a book of great attractiveness. It is full of interesting observations; it expresses and arouses the inquiring spirit. Its happy style suggests that the writing of it must have been a pleasure, and that is certainly true of the reading. We wish there had been an index, for the topics touched on are numerous.

Principles of Aeronautics.

Aeronautics: A Class Text. By Prof. E. B. Wilson. Pp. vii+265. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1920.) Price 22*s.* net.

THE work under notice differs considerably in conception and treatment from that usually associated with the title "aeronautics." It is very clearly written, and will be particularly valuable to advanced students of the subject for many reasons. On the other hand, it will not appeal strongly to the less advanced worker who delights to regard himself as "practical," for he will find only a "skeleton airplane" of the simplest type as a basis for all the calculations made. The more usual curves by which laboratory results are expressed are subordinated to analytical expressions. The peculiar advantages of this point of view are obvious in many places, notably in the treatment of the fall of bodies through air. Without containing such original matter as that of Bryan in "Stability in Aviation," the new volume expresses ideas more nearly those of Bryan than of any other writer on the subject.

The introduction to the book includes the ideas underlying simple flight and the aerodynamics of aerofoils, and the chapters of this section are probably of little importance. It is with the chapter on "Motion in Two Dimensions" that the serious student of aeroplane motion will begin to appreciate the book, for here are collected with concise proofs the fundamental theorems in dynamics which are otherwise only to be found by perseverance in the reading of such volumes as Routh's "Rigid Dynamics." The principles are carried step by step to the consideration of stability, and are then illustrated by example. The study of motion in three dimensions is committed to a following chapter, and starts from the apparently simpler problems relative to fixed axes and uses these as a basis for developing the theorems for moving axes. The reasons for the ultimate simplicity of the latter in relation to complex motions are given, and the treatment is direct and helpful. The last chapter in the section devoted to rigid dynamics applies the equations developed to the stability of the aeroplane. The stage reached is not further than that of English workers, and is obviously dependent on the latter for much of its inspiration; but the chapters are more complete and self-contained than any others available at the moment.

The rest of the book is devoted to "Fluid Mechanics," and here are interposed chapters on the simpler theories generally known as "hydraulics" and the more complex and unfortunately less applicable theorems of velocity potential, etc., of hydrodynamics. The ninth chapter introduces the fundamental laws of laminar motion, and develops the formula for an adiabatic atmosphere. Then follow the important Bernoulli's theorem and the Rayleigh expansion, which indicates the velocity at which air must be considered as a compressible fluid so far as the effect on the resistance of bodies moving through it is concerned. From Bernoulli's equation the laws for Pitot and Venturi tubes are developed on standard lines. Viscous fluids are dealt with in steady motion up to the calculations relating to Poisseuille's famous experiments, and a table of coefficients of viscosity is given.

The fundamental principles of dynamical simi-

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arity, which have been applied so fruitfully in aeronautics, receive attention in chap. xi., and cover the ground rendered familiar to us by the reports of the Advisory Committee for Aeronautics.

The remainder of the book is conventional hydrodynamics, and is a further reminder of the pack of success which has attended the efforts of mathematicians and others to solve the problems of the motion of fluids under conditions resembling those of normal occurrence. As a summary of formulæ the chapters have a value to advanced students.

Taken as a whole, the book is one to be recommended to those students on whom the future developments of aviation will depend, for it contains the fundamental theorems on which the science of the subject rests and must continue to rest for such period as we can now visualise.

Text-books on Chemistry.

(1) *Treatise on General and Industrial Inorganic Chemistry.* By Prof. Ettore Molinari. Second edition. Translated from the fourth revised and amplified Italian edition by Thomas H. Pope. Pp. xix + 876 + 2 plates. (London: J. and A. Churchill, 1920.) Price 42*s*. net.

(2) *Trattato di Chimica Generale ed Applicata all' Industria.* Vol. ii. *Chimica Organica.* By Prof. Ettore Molinari. Parte Prima. Terza edizione riveduta ed ampliata. Pp. xix + 624. (Milano: Ulrico Hoepli, 1920.) Price 28 lire.

(3) *A Text-book of Inorganic Chemistry.* Edited by Dr. J. Newton Friend. Vol. ix. Part 1. *Cobalt, Nickel, and the Elements of the Platinum Group.* By Dr. J. Newton Friend. (Griffin's Scientific Text-books.) Pp. xvii + 367. (London: Charles Griffin and Co., Ltd., 1920.) Price 18s.

(1 and 2) DR. ETTORE MOLINARI is professor of industrial chemistry at the Royal Milan Polytechnic and at the Luigi Bocconi Commercial University in the same city, and his treatises on inorganic and organic chemistry are, apparently, mainly directed to the special character of his teaching in those institutions. Here chemical theory, in effect, is wholly subordinated to practical application, and the books are simply descriptive manuals of chemical technology, adapted to the needs of polytechnic students and suitable for general reading. They may be said to occupy a position intermediate between the general treatise on chemical theory and the specialised handbooks on chemical technology. Prof. Molinari goes so far as to say that his books reflect the change which has come over the teaching of modern chemistry. In his opinion the methods and spirit of the teaching of Liebig, Hofmann, and Kekulé no longer correspond with present-day requirements. The "beneficent impulse" which these great teachers gave to chemical studies was, we gather, too exclusively "scientific" and "theoretical." The author, however, is a little unfortunate in his argument. He could scarcely have selected three names more alive to the utilitarian aspects of chemical science, however mindful they might be of the primary purpose of their calling and profession. The whole development of certain great branches of applied organic chemistry may be said to have sprung directly from the teaching and example of Liebig, Hofmann, and Kekulé. Liebig's genius ranged over practically the whole field of the industrial chemistry of his day; Hofmann early threw himself, with characteristic zeal and energy, into the newly created synthetic colour industry, the enormous extension of which is fundamentally based upon Kekulé's fruitful conception.

Prof. Molinari insists that "general chemistry can no longer be a simple and arid exposition of fundamental laws and of the properties of the innumerable known substances, but should possess a soul which brings it into contact with the vital activities around which it clings." "The chemical text-books which have been used up to the present time do not correspond sufficiently with these requirements." "The present treatise took its rise from these considerations, and has no other pretensions than to be an attempt to initiate a work of reform in the teaching of chemistry."

These excerpts are taken from the preface to the first edition of the former of Prof. Molinari's two works cited above, in which the author sketches the general plan of his work and makes his *apologia* for its special character. In the preface to the fourth Italian edition, on which the present English edition is based, he enforces his point of view. The Great War, he contends, "has emphasised the necessity of developing chemical teaching more and more along the lines of its practical applications." Hence he has been led "to treat the material still more from the industrial standpoint." Various chapters have been considerably enlarged, "certain improvements—presumed or real—being indicated only by the numbers of the patents in question, so that the further details may be ascertained from the journals of applied chemistry." Considering the class of person to whom the work is ostensibly

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